## CONTENTS

- 1 Influence of temperature and strain rate on tensile properties of 15Cr-2·2Mo-15Ni-Ti modified austenitic stainless steel
  - S. Venkadesan, S. Venugopal, M. Vasudevan, and P. V. Sivaprasad
- 8 Effect of cooling rate on intercritically reheated microstructure and toughness in high strength low alloy steel
  C. L. Davis and J. E. King
- 16 Effect of molybdenum substitution on crystal structure of ordered Fe-Al alloys U. Prakash, R. A. Buckley, and H. Jones
- 21 Effect of whisker orientation on toughening behaviour and cutting performance of SiC<sub>w</sub>-Al<sub>2</sub>O<sub>3</sub> composite H. Xiao, X. Ai, and H. S. Yang
- 26 Superplastic forging procedures for manufacture of ceramic yttria stabilised tetragonal zirconia products I. A. Akmoulin, M. Djahazi, N. D. Buravova, and J. J. Jonas
- 35 Comparison of compressive and tensile properties of magnesium based metal matrix composites D. J. Towle and C. M. Friend
- 42 Computerised model of temperature changes during metal extrusion A. Greasley and H. Y. Shi
- 48 Microstructure of Al-Fe alloys sintered via in situ microfusion process C. Hu and T. N. Baker
- 57 Superplastic bulge forming of domes Song Yu-Quan and Z. C. Wang
- 61 Mechanical properties of Co<sub>3</sub>Ti with simultaneous additions of tungsten and boron S. Hasegawa, S. Wada, T. Takasugi, and O. Izumi
- 67 Short Communication New method for studying influence of alloying elements on stress in oxide scales Li Meishuan and Li Tiefan

## Papers from symposium 'Understanding and avoiding fracture of materials'

- 71 Editorial
- 72 Prototype fast reactor steam generator unit pressure vessel repairs B. D. Daniels, D. Green, and J. D. C. Henderson
- 75 Integrity of Magnox reactor steel pressure vessels P. E. J. Flewitt, G. H. Williams, and M. B. Wright
- 83 Significance of local brittle zones to structural behaviour S. E. Webster and P. H. Bateson
- 97 Influence of microstructure on grain refining performance of Al-Ti-B master alloys C. D. Mayes, D. G. McCartney, and G. J. Tatlock
- 104 Extrusion processing parameter-mechanical property correlations in rapidly solidified Al-6·7Fe-5·9Ce and Al-6·2Fe-5·9Ce-1·63Si (wt-%) alloy powders
  K. N. Ramakrishnan, H. B. McShane, and T. Sheppard
- 114 Overheat of Al-Li-Cu-Mg-Zr alloy
  Y. L. Wu, J. Qiang, S. C. Wang, and B. C. Liu
- 118 Discontinuous precipitation kinetics in austenitic steels R. G. Faulkner
- 125 Aging between 300 and 450°C of wrought martensitic 13-17 wt-%Cr stainless steels B. Yrieix and M. Guttmann
- 135 Strain induced transformation in C-Mn steel during single pass rolling R. Priestner and L. Ali
- 142 Thermochemical processing of Cu-Ni-Si-Cr-Mg alloy Z. Rdzawski and J. Stobrawa
- 151 Use of reference stress to correlate creep fracture lifetimes of monolithic ceramics in uniaxial tension and flexure
  B. F. Dyson and T. B. Gibbons
- 155 Properties of alumina/Al/alumina joints produced in air atmosphere A. Watanabe, H. Kato, and K. Yoshikawa

- 161 Analysis of beam distortion during hot dip galvanising R. B. Cresdee, W. J. Edwards, P. J. Thomas, and G. F. Voss
- 168 Intergranular corrosion susceptibility of austenitic-ferritic duplex stainless steels: application of potentickinetic reactivation tests
  P. Merino, X. R. Nóvoa, G. Pena, E. Porto, and L. Espada
- 172 Structure and phase composition of cobalt rich coating prepared by laser cladding on low carbon steel N. Pizúrová, J. Komůrka, M. Svoboda, and O. Schneeweiss
- 176 Quenching of steel plates in sodium polyacrylate solutions A. J. Fletcher and W. D. Griffiths
- 189 Overview Casting and heat treatment variables of Al-7Si-Mg alloy K. T. Kashyap, S. Murali, K. S. Raman, and K. S. S. Murthy
- 205 Thermodynamic assessment of Ni-B phase diagram O. Teppo and P. Taskinen
- 213 Electronic structure basis for selection of metal binders for hardmetal systems A. A. Ogwu and T. J. Davies
- 218 Microstructure and property development in low density rapidly solidified Al-Li alloys D. Sampath, R. Dashwood, H. B. McShane, and T. Sheppard
- 228 Strengthening mechanisms in powder metallurgy Al-Li-Hf alloys A. F. Norman and P. Tsakiropoulos
- 235 Effect of inclusions on fatigue behaviour of hardened spring steel M. Larsson, A. Melander, and A. Nordgren
- 246 Flow localisation behaviour of AISI 304L austenitic stainless steel in warm and hot working regions M. Vasudevan, S. Venugopal, S. Venkadesan, and S. L. Mannan
- 253 Hot corrosion resistance of coated single crystal superalloys under marine conditions H.-J. Rätzer-Scheibe and M. R. Winstone
- 259 Effect of low temperature on resistance of stable austenitic steel to embrittlement by hydrogen J. R. Buckley and D. Hardie
- 264 Application of laser beam welding to joining of continuous fibre reinforced composite to metal S. Fukumoto, A. Hirose, and K. F. Kobayashi
- 277 A theory of cementite A. H. Cottrell
- 281 Intrinsic thresholds in polycrystalline Udimet 720 P. A. S. Reed, W. F. Gale, and J. E. King
- 288 Precipitation sequence for simultaneous continuous and discontinuous modes in Cu-Be binary alloys H. Tsubakino, R. Nozato, and A. Yamamoto
- 295 Effects of phosphorus on creep behaviour of nickel and Ni-20Cr and on creep and strength of Nimonic 80A
  E. Gärtner and H. J. Grabke
- 302 Textures of ferritic stainless steels D. Raabe and K. Lücke
- 313 Extrusion limit diagrams containing structural and topological information for AA 6063 aluminium alloy M. P. Clode and T. Sheppard
- 319 Tensile behaviour of squeeze cast and forged short alumina fibre reinforced AA 6061 S. Bengtsson and R. Warren
- 328 Effects of shear stress and change in void shape on distortion and densification of powder compacts R. B. Clough and R. J. Schaefer
- 336 Potentiostatic etching of duplex stainless steels and high chromium white cast irons J. H. Potgieter and P. de Visser
- 343 Microstructural properties and hot pressing of rapidly solidified hypoeutectic low alloy white cast iron powders Li Hong, C. F. Burdett, and Wang Youming
- 349 Novel processing of brazing aluminium to aluminium and to austenitic stainless steel K. Suganuma and N. Kawakami
- 365 Overview Surface analysis: current capabilities J. C. Rivière
- 378 Thermodynamic evaluation of Ti-W system Zhan-peng Jin and Caian Qiu

- 384 Interphase precipitation in microalloyed engineering steels and model alloy F. A. Khalid and D. V. Edmonds
- 397 Recovery of highly strained Fe-28 at.-%Al alloy Y. Jirásková, M. Kočová, N. Pizúrová, T. Žák, and O. Schneeweiss
- 403 Seizure resistance characteristics of Cu-Pb bearing alloys
  J. P. Pathak
- 408 Morphological changes and hardness evolution in Cu-30Ni-5Cr and Cu-45Ni-15Cr spinodal alloys F. Findik and H. M. Flower
- 417 Liquid phase bonding of aluminium and aluminium/Nicalon composite using copper interlayers R. S. Bushby and V. D. Scott
- **424** Influence of aluminium on carbide precipitation in low carbon microalloyed steels H. Xue and T. N. Baker
- 430 Extrusion of AA 2024 alloy T. Sheppard
- 441 Diffusion bonding of high temperature titanium alloy IMI 834
  A. Wisbey and P. G. Partridge
- 453 Materials science perspective of metal fatigue resistance K. J. Miller
- 463 Aluminium nitride: review of synthesis methods
  G. Selvaduray and L. Sheet
- 474 Modelling of microsegregation V. R. Voller and S. Sundarraj
- 483 Microstructural development during consolidation of inert gas atomised Al-7Mg-1Zr powder alloy R. J. Dashwood and T. Sheppard
- 493 Grain refinement and superplasticity of high strength 7475 aluminium alloy Jiang Xinggang, Cui Jianzhong, and Ma Longxiang
- 497 Influence of tensile stress on behaviour of grain boundary segregants and related interactions between trace and solute elements in 2·6Ni-Cr-Mo-V low alloy steel
  R. D. K. Misra and P. Rama Rao
- 502 Microstructural characterisation and mechanical properties of Ni-Ge alloys containing Ni<sub>3</sub>Ge A. Gupta, M. C. Chaturvedi, and A. K. Jena
- 507 Development of corrosion resistant magnesium alloys Part 1 Characterisation of splat quenched Mg-10Al and Mg-16Al alloys C. B. Baliga and P. Tsakiropoulos
- 513 Development of corrosion resistant magnesium alloys Part 2 Structure of corrosion products on rapidly solidified Mg-16Al alloys C. B. Baliga and P. Tsakiropoulos
- 520 Diffusion bonding of SiC/Ti-6Al-4V composite to Ti-6Al-4V alloy and fracture behaviour of joint S. Fukumoto, A. Hirose, and K. F. Kobayashi
- 528 Bonded propshafts: design and assembly of composite tubes and metal end fittings A. Price and R. J. Moulds
- 536 Hydrogen pickup in ion nitrided steels J. Rickards, R. Trejo-Luna, M. E. Ortiz, E. Andrade, E. Chávez, E. P. Zironi, H. del Castillo, and M. Sánchez
- 545 Influence of isothermal phase transformations on toughness and pitting corrosion of super duplex stainless steel SAF 2507
  J. O. Nilsson and A. Wilson
- Effect of hot isostatic pressing on mechanical properties and microstructure of 70-30 cupronickel castings
   A. J. Fletcher, S. King, B. Rickinson, and H. Atkinson
- 562 Constitution of Al rich alloys of Al-Cu-Mg-Li system S. G. Lawson-Jack, H. M. Flower, and D. R. F. West
- 572 Austempering of low manganese ductile irons Part 1 Processing window N. Darwish and R. Elliott
- 586 Austempering of low manganese ductile irons Part 2 Influence of austenitising temperature N. Darwish and R. Elliott

ک

- 603 Laser beam welding of austenitic/ferritic dissimilar steel joints using nickel based filler wire Z. Sun and T. Moisio
- 609 Preparation of carbon fibre reinforced aluminium via ultrasonic liquid infiltration technique H. M. Cheng, Z. H. Lin, B. L. Zhou, Z. G. Zhen, K. Kobayashi, and Y. Uchiyama
- 615 Static bend strength of carburising steel SS 2506 S. Preston
- 620 Evolution of microstructure of AISI 347 stainless steel during heat treatment I. Ben-Haroe, A. Rosen, and I. W. Hall
- 633 Interface microstructures in diffusion bonding of titanium alloys to stainless and low alloy steels B. Alemán, I. Gutiérrez, and J. J. Urcola
- 642 X-ray diffraction study of spinodal decomposition in Ni-14·5 at.-%Ge alloy Z. He and M. C. Chaturvedi
- 647 Precipitation in Incoloy alloy 909
  Z. Chen, J. W. Brooks, and M. H. Loretto
- 654 Influence of minor additions on characteristics of Cu-Al-Ni alloy S. Bhattacharya, A. Bhuniya, and M. K. Banerjee
- 659 Microstructure and mechanical properties of SiC whisker reinforced ZrO<sub>2</sub>-6 mol.-%Y<sub>2</sub>O<sub>3</sub> composites G. Y. Lin, T. C. Lei, Y. Zhou, and S. X. Wang
- 665 Combined model of grain boundary precipitation and segregation of high strength aluminium alloys R. G. Faulkner and H. Jiang
- 672 Influence of retrogression and reaging on microstructure and properties of 8090 Al-Li alloy Y. L. Liu, Z. Q. Hu, Y. Zhang, and C. X. Shi
- 678 Effect of consolidation temperature on mechanical properties of rapidly solidified Al-7Mg-1Zr alloy R. J. Dashwood and T. Sheppard
- 686 High temperature deformation of rapidly solidified 7091 powder metallurgy aluminium alloy H. N. Azari, G. S. Murty, and G. S. Upadhyaya
- 691 Aluminium and Al-45Cu alloy end chill: structural observation and heat flow analysis N. A. El-Mahallawy, M. A. Taha, A. M. Assar, and R. M. Hamouda
- 698 Microstructural evolution of pure iron during hot rolling Wang Rizhi and T. C. Lei
- 705 Effect of austenite grain refinement on morphology of product of bainitic reaction in austempered ductile iron
  C. R. F. Azevedo, A. A. Garboggini, and A. P. Tschipitschin
- 711 Effect of M<sub>7</sub>C<sub>3</sub> → M<sub>23</sub>C<sub>6</sub> transformation on fracture behaviour of cast ferritic stainless steels M. Vardavoulias, G. Papadimitriou, and D. Pantelis
- 718 Effect of molybdenum on microstructure and mechanical properties of intercritically annealed and isothermally transformed low carbon steel
  Y. Sakuma, D. K. Matlock, and G. Krauss
- 729 Overview Applicability of sol-gel processing in production of silica based optical fibres A. B. Seddon
- 737 Hot upset forging of Ti<sub>3</sub>Al base Superalpha 2 alloy C. Huang, Z. Chen, T. A. Dean, and M. H. Loretto
- 742 Effect of thermal and mechanical processing on tensile properties of powder formed 2124 aluminium and 2124 Al-SiC<sub>p</sub> metal matrix composite M. P. Thomas and J. E. King
- 754 Residual stress mapping in multipass ferritic steel weld J. H. Root, T. M. Holden, J. Schröder, C. R. Hubbard, S. Spooner, T. A. Dodson, and S. A. David
- 760 Influence of intercritical annealing on strength and impact behaviour of steels B. Mintz, R. Vipond, and A. Nassar
- 773 Influence of postweld heat treatment on creep properties of 1Cr-0.5Mo welded joints Rui Wu, J. Storesund, and R. Sandström
- 781 Effect of vanadium and beryllium on S' (Al<sub>2</sub>CuMg) precipitation in Al-Li-Cu-Mg alloy 8090 A. Luo and W. V. Youdelis
- 785 Development of microstructure and properties during extrusion and rolling of Al-7Mg-1Mn gas atomised powder
  R. Dashwood, H. McShane, and T. Sheppard

- 793 Microstructural degradation of aluminide coatings on single crystal nickel based superalloys during high temperature exposure W. F. Gale and J. E. King
- 799 Characterisation and consolidation of mechanically alloyed 50Ni-50Ti (at.-%) powder mixtures T. Itsukaichi, S. Ohura, J. G. Cabañas-Moreno, M. Umemoto, and I. Okane
- 805 Processing map for hot working of as cast magnesium O. Sivakesavam, I. S. Rao, and Y. V. R. K. Prasad
- 811 Deformation behaviour during low cycle fatigue testing of 60Sn-40Pb solder R. Sandström, J.-O. Österberg, and M. Nylén
- 820 Influence of various electrolysis parameters and electrode characteristics on corrosion behaviour of titanium supported RuO<sub>2</sub>-TiO<sub>2</sub> anodes
  J. M. M. Millet and A. Sebaoun
- 833 Properties of reactively cast Al-TiB<sub>2</sub> alloys J. V. Wood, P. Davies, and J. L. F. Kellie
- 841 Influence of heat treatment and hot working on fracture toughness of cast aluminium base composites L. Wei and J. C. Huang
- 853 Mechanical properties of aluminium alloy 6061-Al<sub>2</sub>O<sub>3</sub> composites J. W. Luster, M. Thumann, and R. Baumann
- 863 Yield strength of two ductile phase alloys Z. Fan, P. Tsakiropoulos, and A. P. Miodownik
- 869 Modelling initiation of surface damage on aluminium by high velocity water jets D. J. Stephenson, S. A. Impey, M. Malik, and P. Hancock
- 874 Static recrystallisation kinetics of commercial aluminium: influence of hot deformation mode S. Martin, I. Gutierrez, and J. J. Urcola
- 882 Austempering of low manganese ductile irons
  Part 3 Variation of mechanical properties with heat treatment conditions
  N. Darwish and R. Elliot
- 890 Grain control in mechanically alloyed oxide dispersion strengthened MA 957 steel T. S. Chou and H. K. D. H. Bhadeshia
- 899 Processing map for hot working of stainless steel type AISI 316L S. Venugopal, S. L. Mannan, and Y. V. R. K. Prasad
- 907 Influence of deformation induced ferrite, grain boundary sliding, and dynamic recrystallisation on hot ductility of 0·1-0·75%C steels
  B. Mintz, R. Abu-Shosha, and M. Shaker
- 915 Tempering effects on high temperature brittle intergranular fracture in Mn-Mo-Ni steel I. A. Vatter, C. E. Lane, and C. A. Hippsley
- 923 Computer prediction of location of heat centres in castings N. Sirilertworakul, P. D. Webster, and T. A. Dean
- 929 Short Communication Quick non-graphical method for deducing slip systems in cubic close packed metals in tension or compression I. M. Hutchings
- 937 Overview Recent advances in sol-gel processing for improved materials synthesis
  G. Wilson and A. Patel
- 945 Effect of transition/rare earth metal oxide additives on densification during sintering of Si<sub>3</sub>N<sub>4</sub> A. A. Ogwu and T. J. Davies
- 948 Al-Ti-C phase diagram L. Svendsen and A. Jarfors
- 958 Heat transfer during vapour blanket stage of quench A. J. Fletcher and W. D. Griffiths
- 967 Influence of lithium additions on precipitation and age hardening of 7075 alloy Z. W. Huang, M. H. Loretto, and J. White
- 981 Characterisation of evolution of microstructure during processing of Al-Li-Mg-Cu-Zr cast alloys
  S. Kumar and H. B. McShane
- 987 Superplastic deformation and postformed mechanical properties of high temperature titanium alloy IMI 834
  A. Wisbey, M. W. Kearns, P. G. Partridge, and A. W. Bowen

- 994 Effect of rapid solidification, impurity level, and further alloy additions on dissolution rate of Mg-Mn alloys in 3%NaCl solution D. Rugg, R. G. J. Edyvean, and H. Jones
- 1001 Cyclic hardening, softening, and crack growth during high temperature fatigue R. P. Skelton
- 1009 Evaluation of threshold stress intensity in high strength hydrogen charged steel in low strain rate tension tests
  B. Ule, F. Vodopivec, L. Vehovar, J. Žvokeli, and L. Kosec
- 1014 Microstructure-property relationships in tempered low alloy Cr-Mo-3·5Ni-V steel S. Maropoulos, J. D. H. Paul, and N. Ridley
- 1021 Criteria for prediction of flow instabilities and microstructural manifestations during warm working of AISI 304L stainless steel
  S. Venugopal, S. L. Mannan, and Y. V. R. K. Prasad
- 1031 Temper resistance of pressure hull steel microalloyed with niobium, titanium, and vanadium I. M. Robertson
- 1037 Characteristics of shear banding in dual phase steel Zhu Chen, Hong Youshi, and Li Guochen
- 1049 Overview Monotectic systems S. C. Sarson and J. A. Charles
- 1062 Unusual behaviour of variations in lattice parameter of nickel rich Ni-Ge solid solutions with composition Z. He and M. C. Chaturvedi
- 1069 Use of Rodrigues-Frank space for representation of microtexture and grain boundary parameters V. Randle and A. Day
- 1079 Continuity of plastic strain rate in stress relaxation tests S. K. Ray, G. Sasikala, P. Rodriguez, and D. H. Sastry
- 1086 Three-dimensional measurement of short fatigue cracks using scanning acoustic microscopy D. Knauss, D. D. Bennink, J. W. Martin, G. A. D. Briggs, and T. Zhai
- 1094 Microstructural characterisation of two phase materials Z. Fan, A. P. Miodownik, and P. Tsakiropoulos
- 1101 Influence of low additions of copper on properties of Al-Li-Mg-Zr alloy S. Kumar, H. B. McShane, and T. Sheppard
- 1106 Short transverse fracture of Al-Li-Cu-Mg-Zr extrudate H. X. Li, C. Q. Chen, Z. X. Luan, and Z. Q. Qian
- 1115 Influence of precipitation and segregation on hydrogen embrittlement in aged 9Cr-1Mo steel G. R. Jordan, S. J. Andrews, and C. A. Hippsley
- 1123 Nitrogen uptake by austenitic stainless steels on annealing in N<sub>2</sub>-H<sub>2</sub> atmospheres R. F. A. Jargelius-Pettersson, T. Ekman, S. Hertzman, T. Holm, and J. Linder
- 1133 New toughness parameters from tensile test for optimising postweld heat treatment of Alloy 800/2·25Cr-1Mo steel joint A. K. Bhaduri, S. K. Ray, and P. Rodriguez
- 1137 Model for CO<sub>2</sub> laser welding of stainless steel, titanium, and nickel: parametric study F. Bonollo, A. Tiziani, and A. Zambon

## **Book reviews**

pages 93, 185, 273, 359, 447, 539, 627, 725, 829, 933, 1045, 1147

## Conference diary

pages 95, 187, 275, 363, 451, 543, 631, 727, 831, 935, 1047, 1151

